

## Description of the Larva of *Ceraclea lobulata* (Martynov) (Insecta: Trichoptera: Leptoceridae)

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### ABSTRACT

The larval stage of *Ceraclea lobulata* (Martynov) is described for the first time. The larva can be distinguished from other known larvae of Korean *Ceraclea* by the absence of head marking and by the shape of frontoclypeus, which is equal in anterior and posterior width. The larval case is also described. Line-drawings of key characters and discussion on Korean *Ceraclea* are provided.

**Key words:** *Ceraclea lobulata*, Leptoceridae, Trichoptera, larva, description

### INTRODUCTION

The Leptoceridae is a large family of caddisflies that is well represented in the Holarctic and Oriental Regions. The family currently contains 1255 species in the world (Morse, 1997). The genus *Ceraclea* of Leptoceridae is a common aquatic insect group, which occurs in lotic and lentic habitats in Korean streams. The larvae generally construct cases of fine sand grains and plant materials. Majority of the species of *Ceraclea* have a univoltine life cycle in temperate regions with a larval stage of five instars (Resh, 1976).

Twelve species of *Ceraclea*, *Ceraclea alboguttata* (Hagen), *C. annulicornis* (Stephens), *C. armata* Kumanski, *C. coreana* Kumanski, *C. excisa* (Morton), *C. gigantea* Kumanski, *C. hastata* (Botosaneanu), *C. lobulata* (Martynov), *C. mitis* (Tsuda), *C. morsei* Kumanski, *C. shuotsuensis* (Tsuda), and *C. sibirica* (Ulmer), are known in the Korean Peninsula by Morse (1975), Mey (1989), Kumanski (1991), Park and Bae (1998), and Park et al. (1999), but all of the above species are known in adult stages only. Yoon and Kim (1988) described three species of unnamed larvae, *Ceraclea* KUa, *Ceraclea* KUb, and *Ceraclea* KUc, in Korea, but they have not been associated with the known adults.

We collected larvae of *Ceraclea* from the Han River in Seoul and successfully reared into adults in the laboratory. We herein describe the larval stage of *Ceraclea lobulata* (Martynov) for the first time.

### MATERIALS AND METHODS

Mature larvae of *C. lobulata* were collected from Godeok-

dong area of the Han River in Seoul in May 2006. The larvae were reared in an aquarium (18 × 11 × 14 cm), which was placed in an emergence cage (55 × 41 × 42 cm). Room temperature maintained 22-24°C and attached algae, which were brought from the collecting site, were provided for food. The larvae emerged after a period of 20 days rearing. Specimens were examined with microscopes (Leica MZ8; Carl Zeiss Stemi 2000-C with AxioCam MRc5; CETI Maxbino). All the specimens are preserved in 80% EtOH and deposited in the Aquatic Insect Collection of Seoul Women's University (SWU-AIC).

### DESCRIPTION

#### *Ceraclea lobulata* (Martynov) (Fig. 1)

*Leptocerus lobulatus* Martynov, 1935 (for full description see Yang and Morse, 1988: 16).

*Ceraclea lobulata* (Martynov): Morse, 1975: 40; Mey, 1989: 304; Kumanski, 1991: 62; Park and Bae, 1998: 35; Park et al., 1999: 156.

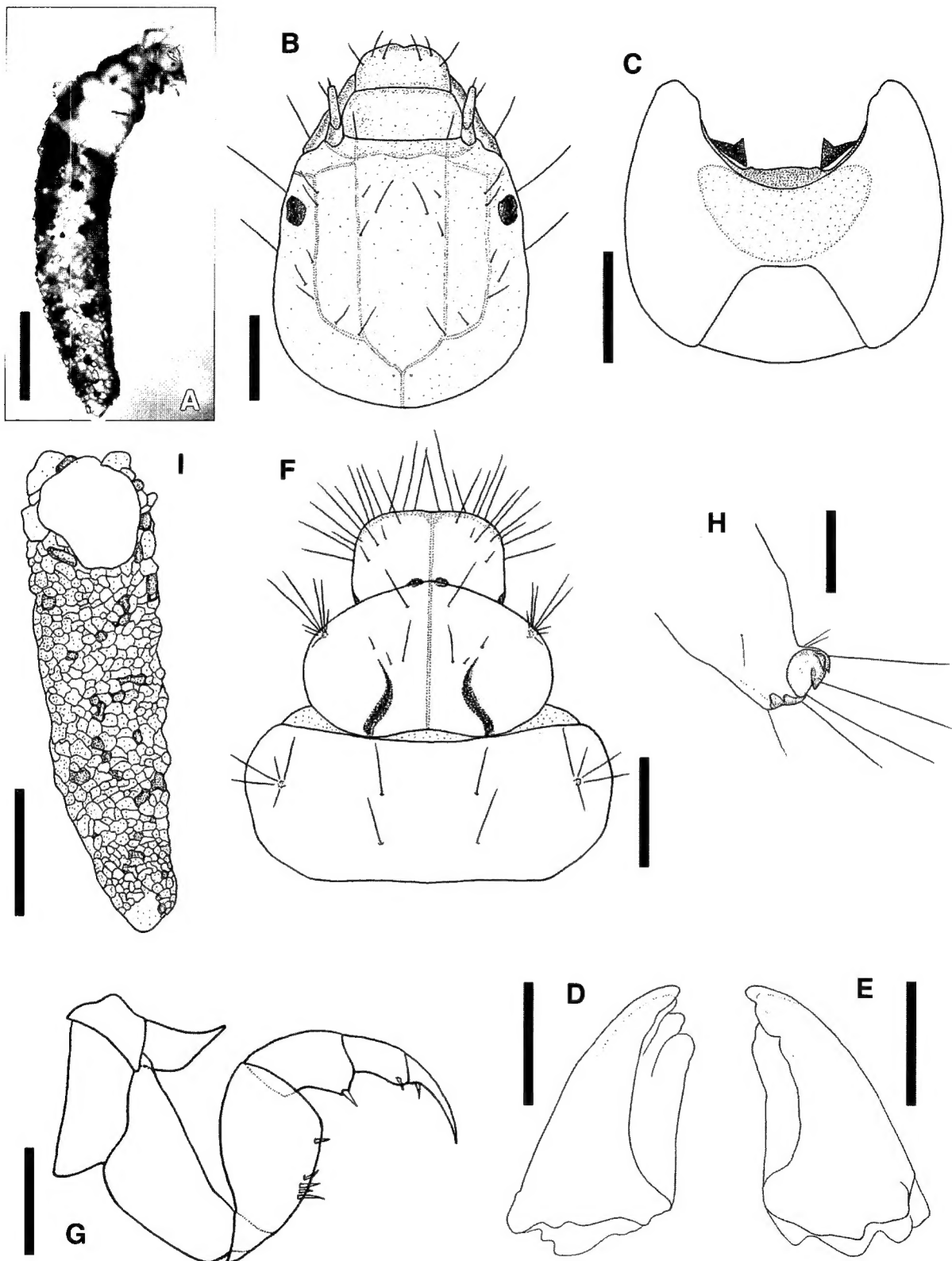
**Material examined.** KOREA: 1 larva: Gyeonggi-do, Han River at Paldang, 8-IX-1998, SWU-AIC; 6 larvae and 3♂♂ (reared and emerged on 11-12-VI-2006): Seoul, Han River at Godeok-dong, 23-V-2006, S.W. Jung, SWU-AIC.

Last instar larva (Fig. 1A). Body length 7-8 mm, stout-bodied; general body color light yellow. Head (Fig. 1B) 0.62 mm in length, 0.56 mm in width, slightly longer than wide; distance between compound eyes 0.44 mm. Dorsal and ventral head color yellow, without markings; parafrontal areas present; ventral apotome crescent-shaped (Fig. 1C) and wider than long. Antennae 0.13 mm in length, 0.02 mm in width, 6-7 × longer than wide, 2-segmented with single seta apically; mandibles (Fig. 1D, E) with pronounced four

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**Fig. 1.** Last instar larva of *Ceraclea lobulata*. A, whole larva with case; B, dorsal head; C, ventral head; D, left mandible; E, right mandible; F, dorsal thorax; G, foreleg; H, anal claw; I, case. Scale bars=2 mm (A, I), 0.2 mm (B, C, G), 0.5 mm (F), 0.1 mm (D, E, H).

teeth. Pronotum (Fig. 1F) yellowish, with a pair of black sclerites submedially on posterior margin, and with 20 setae along anterior margin. Mesonotum (Fig. 1F) largely covered by paired large and weakly sclerotized plates; sa1 and sa2 each with single seta; sa3 with eight setae; mesonotal bars with brown posterior halves; anterior halves light yellow. Metanotum (Fig. 1F) without sclerites; sa1 and sa2 each with single seta; sa3 with five setae; ventral part with eight setae horizontally. Forelegs (Fig. 1G) stouter than other legs, with elongated and pointed foretrochantin. Abdominal segment I with two lateral humps and single dorsal hump; each lateral hump with two setae (one seta longer); abdominal segments II-VII with well-developed clustery gills; abdominal segment IX with weakly sclerotized plates, with a pair of protuberances, and with a pair of setae posteriorly; anal claws (Fig. 1H) with two accessory hooks dorsally.

*Case* (Fig. 1I). Body of case 7.2-9.2 mm in length, cylindrical; posterior part slightly curved and terminally fenestrate; matrix of *case* mainly composed of fine sand grains mixed with larger particles.

*Diagnosis*. The larva of *C. lobulata* can be distinguished from that of other known Korean *Ceraclea* (*Ceraclea* KUa, *Ceraclea* KUb, and *Ceraclea* KUc) by the absence of head marking and by the shape of frontoclypeus, which is equal in anterior and posterior width (Fig. 1B). Additional diagnostic characters such as the anal claws with two accessory hooks, the pointed foretrochantin, and the thoracic setation may also distinguish the larva from its congeners.

*Habitat*. The larvae of *C. lobulata* were found in a large river, in which the water is slow-flowing (water temperature 18.5°C on May 23, 2006) and the substrate is composed of pebble and boulder-sized stones lied on sandy bottom. The substrate was covered with silt and dense attached filamentous algae. The larvae were found on the stone surface.

## DISCUSSION

Kim (1974) described eight species of unnamed larvae of Leptoceridae: *Tripectides* KA, *Leptocerus* KA, *Leptocerus* KB, *Leptocerus* KC, *Leptocerus* KD, *Leptocerus* KE, *Mystacides* MA, and *Mystacides* KA. Based on the descriptions and line-drawings of the above leptocerid species, e.g., paired dark bars on mesonotum (Kim, 1974), *Tripectides* KA, *Leptocerus* KB, *Leptocerus* KD, and *Leptocerus* KE can be placed to the genus *Ceraclea*. Yoon and Kim (1988) and Yoon (1995) also described three unnamed larvae of *Ceraclea*: *Ceraclea* KUa, *Ceraclea* KUb, and *Ceraclea* KUc. Although we successfully determined the larva of *C. lobulata* from reared male adults, the associations of this

larva with other unnamed larvae, listed above, were not possible based only on the descriptions provided by the authors.

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